

OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **LOON LAKE** the program coordinators recommend the following actions.

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *slightly worsening* in-lake chlorophyll-a trend, however concentrations decreased this season. The increase in rain we experienced this season may have flushed out any build up of nutrients in the lake, and decreased algal growth. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.
- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *stabilizing* trend in lake transparency. Transparency in the lake improved this season with the decrease in algal abundance. Mean clarity was above the NH mean reference line for the first time since 1996. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.
- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *stabilizing* trend for in-lake

phosphorus levels. Phosphorus concentrations in the epilimnion and hypolimnion were slightly higher this season. Hypolimnetic phosphorus concentrations were elevated in August, and the turbidity of the sample could have been responsible for this result. Sample contamination with bottom sediment can raise phosphorus concentrations and yield inaccurate results. The slightly elevated concentrations in the epilimnion in August might have been caused by an increase in rainfall noted by the monitors. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- Beavers have built a dam on Mill Brook. Beaver dams can block the natural water flow of the inlet, which results in stagnant waters. Nutrients then tend to accumulate and become more concentrated by the decreased flushing rate. Phosphorus concentrations (Table 8) and the turbidity (Table 11) of Mill Brook increased from the 1999 season. These increases could be a result of increased rainfall flushing excess nutrients from the beaver dam into the lake.
- Conductivity has remained low for all stations tested since Loon Lake joined the VLAP program in 1989. Conductivity has remained below the mean value of 56.8 umhos/cm for NH lakes and ponds (See Chemical Monitoring Parameters). Conductivity increases often indicate the influence of human activities on surface waters. This stable trend is a positive sign. Septic system leachate, agricultural runoff, iron deposits, and road runoff can all influence conductivity.
- Around 20 Canada geese were observed on the lake at several times this summer. This continues to be a nuisance to the residents of the lake. For information on how to keep these birds from taking over Loon Lake please consult the Spring 2001 edition of The Sampler, the VLAP newsletter.

NOTES

- Monitor's Note (7/4/00): New beaver dam on Mill Brook. Beautiful day.
- Monitor's Note (7/21/00): 19 grown Canadian geese in lake and meadow.
- Monitor's Note (8/12/00): Lots of rain recently. Large number of grown geese still on the lake, ~15-20.

USEFUL RESOURCES

Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, NHDES-WD 97-8, NHDES Booklet, (603) 271-3503

Clean Water in Your Watershed. Terrene Institute, 1993. (800) 726-4853

Vegetated Shoreline Buffers, video, North Country RC&D, (603) 527-2093

In Our Backyard. 1994. Terrence Institute, 4 Herbert St., Alexandria, VA. 22305, or call (800) 726-4853.

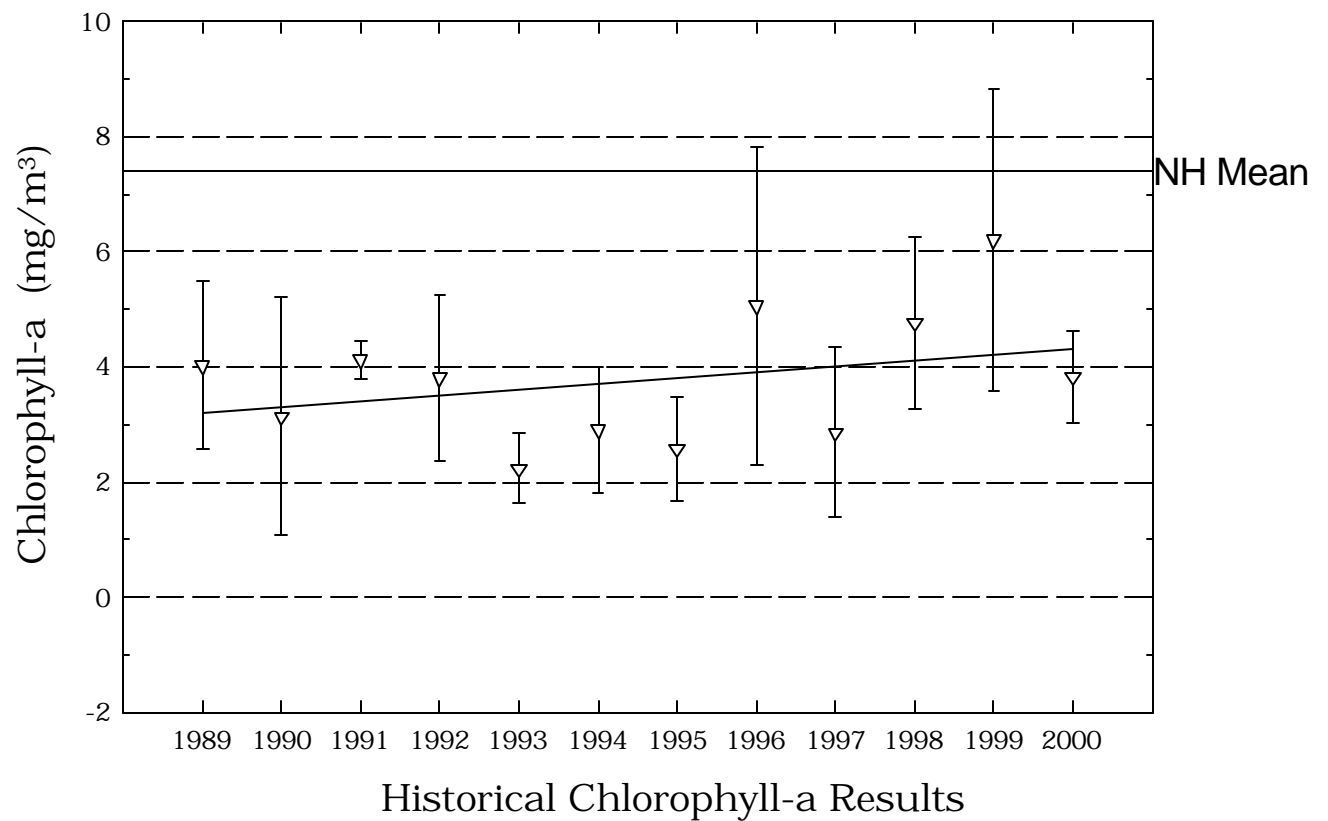
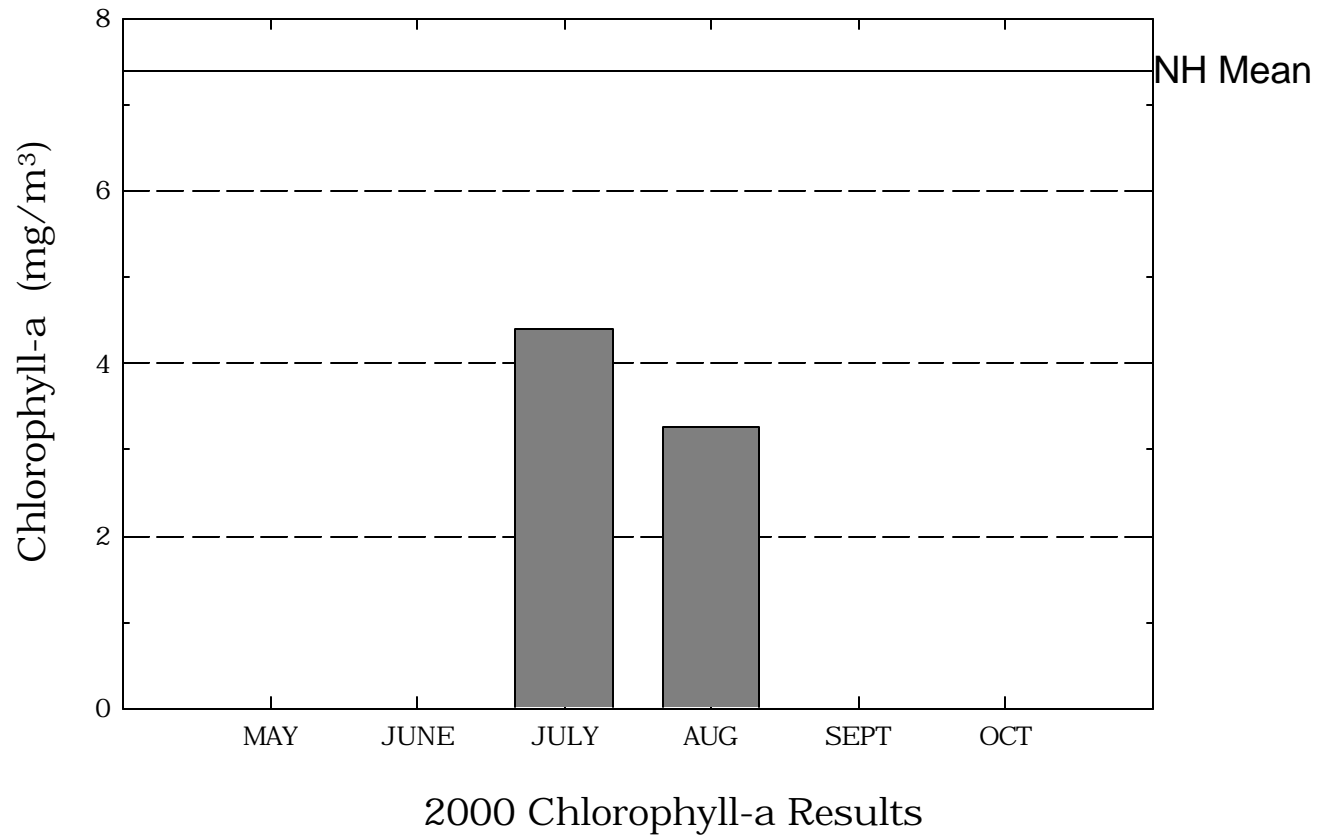
Beavers and Their Control. UNH Cooperative Extension/NH Fish and Game, 1990. (603) 862-2346, or ceinfo.unh.edu

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, WD-BB-9, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Bacteria in Surface Waters, WD-BB-14, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

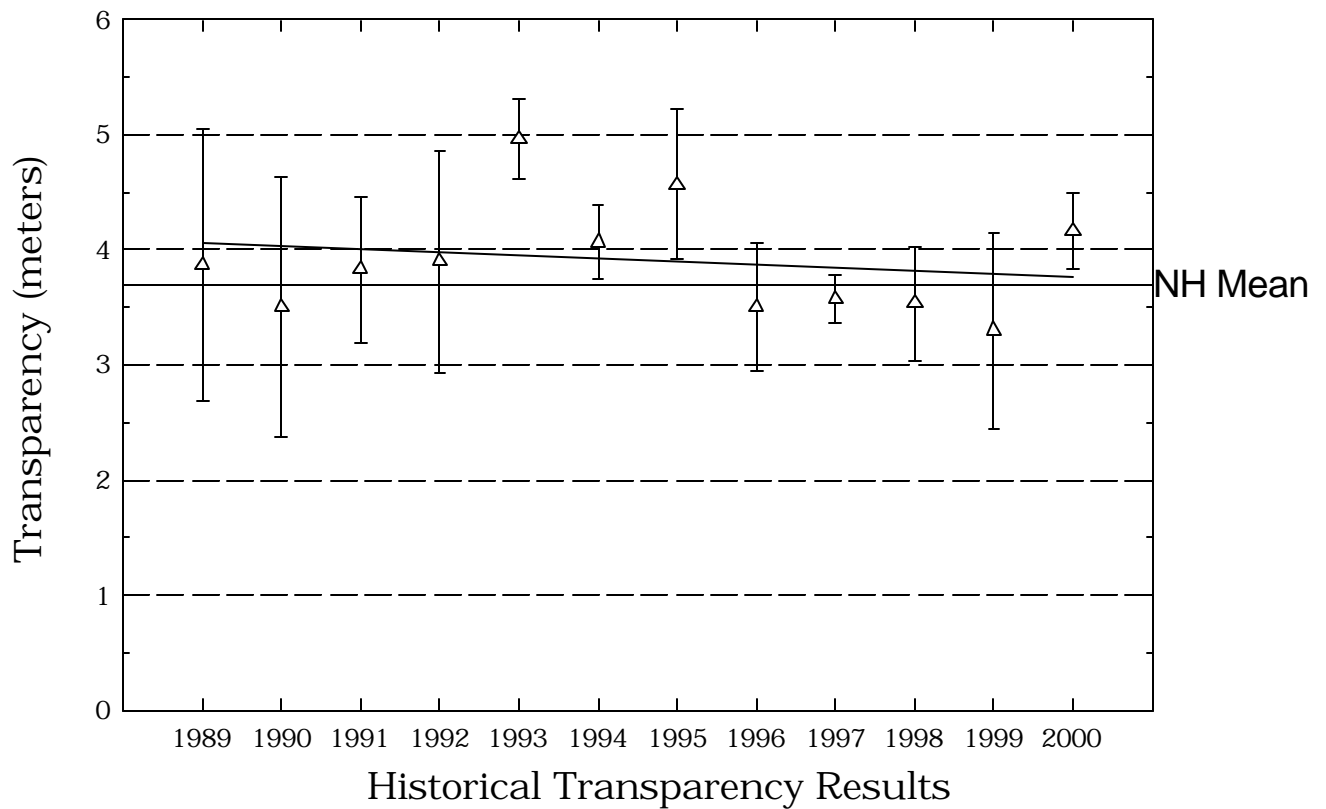
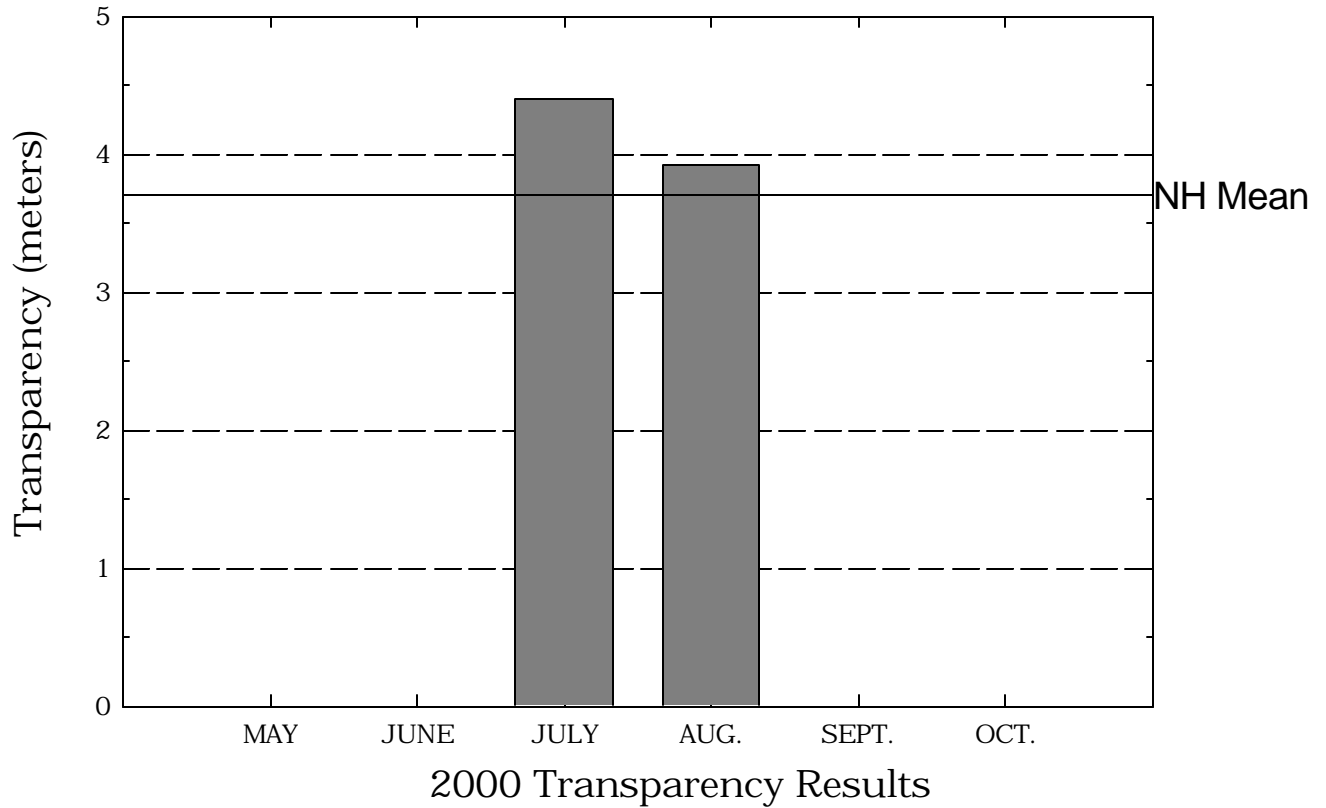
Loon Lake

Figure 1. Monthly and Historical Chlorophyll-a Results



Loon Lake

Figure 2. Monthly and Historical Transparency Results



Loon Lake

Figure 3. Monthly and Historical Total Phosphorus Data.

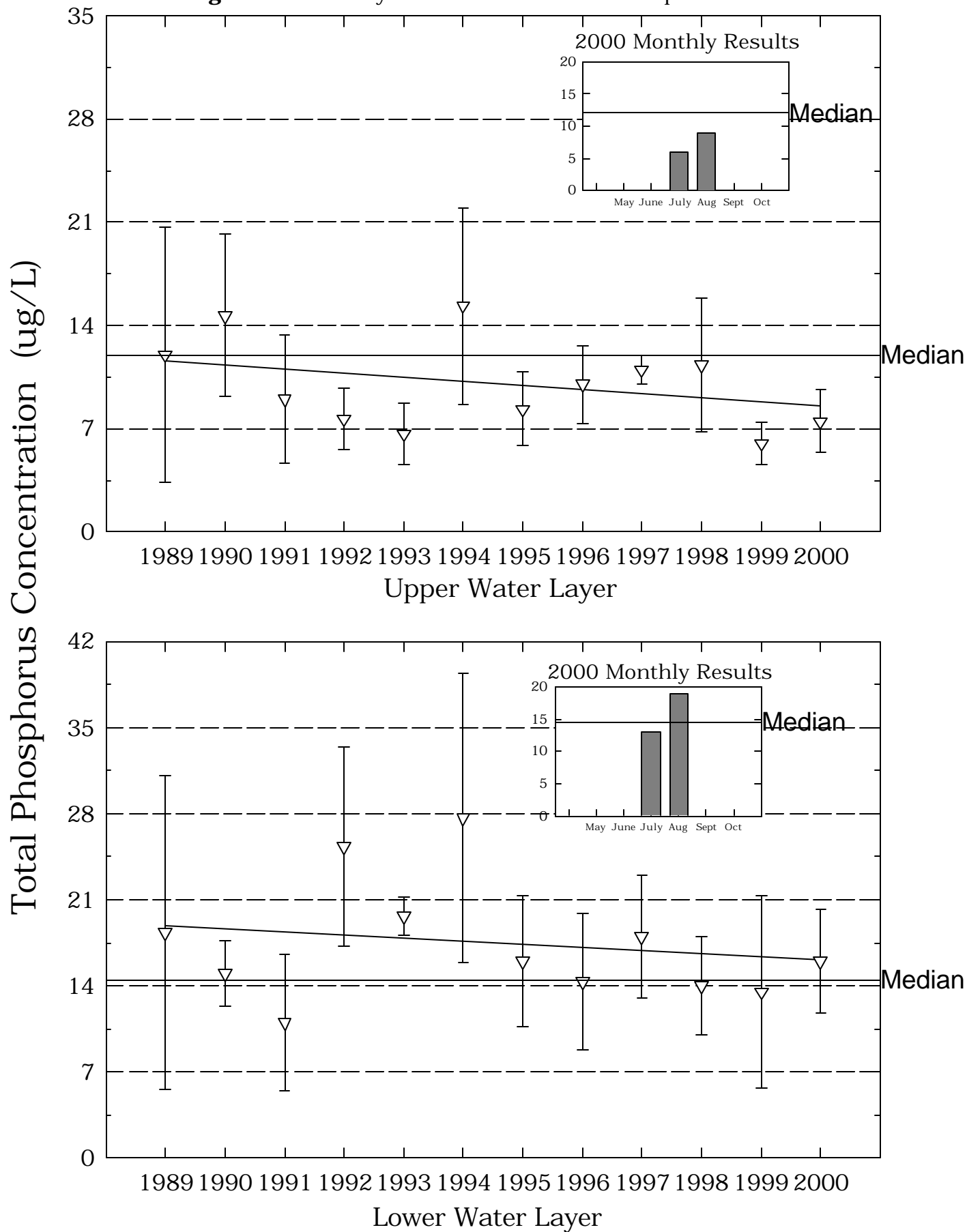


Table 1.**LOON LAKE
PLYMOUTH****Chlorophyll-a results (mg/m³) for current year and historical
sampling periods.**

Year	Minimum	Maximum	Mean
1989	2.56	5.48	4.02
1990	1.57	5.48	3.13
1991	3.84	4.50	4.12
1992	2.18	4.93	3.81
1993	1.78	2.94	2.23
1994	1.64	3.63	2.91
1995	1.59	3.39	2.57
1996	3.13	8.22	5.05
1997	1.45	4.39	2.85
1998	3.51	6.42	4.77
1999	4.36	8.06	6.21
2000	3.27	4.39	3.64

Table 2.**LOON LAKE****PLYMOUTH****Phytoplankton species and relative percent abundance.****Summary for current and historical sampling seasons.**

Date of Sample	Species Observed	Relative % Abundance
06/11/1989	DINOBRYON	71
07/15/1990	DINOBRYON	31
	CHRYSOSPHAERELLA	29
	ASTERIONELLA	16
06/10/1991	UROGLENOPSIS	49
	DINOBRYON	37
08/07/1993	CHRYSOSPHAERELLA	52
	ANABAENA	16
07/17/1994	CHRYSOSPHAERELLA	41
	MALLOMONAS	36
06/25/1995	ANABAENA	61
	DINOBRYON	25
	CHRYSOSPHAERELLA	6
07/14/1996	CHRYSOSPHAERELLA	83
	DINOBRYON	11
	ASTERIONELLA	3
08/17/1997	ASTERIONELLA	37
	TABELLARIA	17
	SYNURA	11
07/12/1998	DINOBRYON	51
	TABELLARIA	15
	UROGLENOPSIS	11
07/21/2000	CHRYSOSPHAERELLA	58
	TABELLARIA	16
	MALLOMONAS	8

Table 3.**LOON LAKE****PLYMOUTH**

**Summary of current and historical Secchi Disk
transparency results (in meters).**

Year	Minimum	Maximum	Mean
1989	2.5	4.6	3.8
1990	2.7	4.3	3.5
1991	3.1	4.2	3.8
1992	2.8	4.6	3.9
1993	4.6	5.3	4.9
1994	3.7	4.3	4.0
1995	3.9	5.2	4.5
1996	3.0	4.1	3.5
1997	3.4	3.8	3.5
1998	3.2	4.1	3.5
1999	2.7	3.9	3.3
2000	3.9	4.5	4.2

Table 4.

**LOON LAKE
PLYMOUTH**

**pH summary for current and historical sampling seasons.
Values in units, listed by station and year.**

Station	Year	Minimum	Maximum	Mean
EPILIMNION	1989	6.62	6.71	6.67
	1990	6.37	6.78	6.53
	1991	6.60	6.70	6.64
	1992	6.63	6.67	6.66
	1993	6.82	7.28	6.98
	1994	6.66	6.75	6.70
	1995	6.65	6.92	6.77
	1996	5.43	6.64	5.85
	1997	6.34	6.71	6.53
	1998	6.38	6.62	6.49
	1999	6.47	6.81	6.61
	2000	6.70	6.74	6.72
HYPOLIMNION	1989	6.00	6.08	6.05
	1990	5.88	6.17	5.98
	1991	5.81	6.50	6.02
	1992	5.86	6.18	6.02
	1993	5.95	6.21	6.08
	1994	5.81	6.32	6.03
	1995	6.01	6.47	6.22
	1996	5.60	6.15	5.85
	1997	6.04	6.09	6.06
	1998	5.87	6.05	5.95
	1999	5.95	6.34	6.10
	2000	5.87	6.27	5.99

Table 4.**LOON LAKE
PLYMOUTH**

**pH summary for current and historical sampling seasons.
Values in units, listed by station and year.**

Station	Year	Minimum	Maximum	Mean
INLET #1	1989	6.20	6.93	6.45
	1990	6.70	7.14	6.87
	1991	6.80	7.10	6.97
	1992	6.83	6.93	6.88
	1993	6.66	7.20	6.90
	1994	6.69	6.98	6.79
	1995	6.91	7.10	6.99
	1996	5.95	6.73	6.25
	1997	6.20	7.02	6.52
	1998	6.66	6.82	6.75
	1999	6.82	6.82	6.82
	2000	6.75	6.81	6.79
INLET #2	1989	6.04	6.56	6.28
	1990	6.41	6.78	6.53
	1991	6.50	6.90	6.68
	1992	6.48	6.73	6.59
	1993	6.62	6.81	6.70
	1994	6.55	6.65	6.58
	1995	6.44	6.86	6.65
	1996	5.93	6.55	6.21
	1997	6.54	6.69	6.61
	1998	6.42	6.68	6.52
	1999	6.74	6.74	6.74
	2000	6.41	6.52	6.46

Table 4.**LOON LAKE
PLYMOUTH**

**pH summary for current and historical sampling seasons.
Values in units, listed by station and year.**

Station	Year	Minimum	Maximum	Mean
METALIMNION	1989	6.28	6.79	6.44
	1990	6.14	6.72	6.32
	1991	6.48	6.70	6.58
	1992	6.22	6.63	6.36
	1993	6.51	6.72	6.63
	1994	6.40	6.72	6.54
	1995	6.28	6.64	6.40
	1996	5.85	6.17	6.01
	1997	6.25	6.41	6.34
	1998	5.84	6.53	6.10
	1999	6.21	6.29	6.25
	2000	6.05	6.44	6.23
OUTLET	1989	6.50	6.73	6.57
	1990	6.43	6.75	6.56
	1991	6.60	6.70	6.66
	1992	6.38	6.87	6.63
	1993	6.58	6.76	6.68
	1994	6.65	6.73	6.70
	1995	6.54	6.86	6.63
	1996	6.15	6.61	6.37
	1997	6.52	6.83	6.69
	1998	6.54	6.67	6.60
	1999	6.61	6.61	6.61
	2000	6.66	6.73	6.70

Table 5.**LOON LAKE****PLYMOUTH****Summary of current and historical Acid Neutralizing Capacity.****Values expressed in mg/L as CaCO₃.****Epilimnetic Values**

Year	Minimum	Maximum	Mean
1989	3.20	3.60	3.43
1990	2.70	3.70	3.27
1991	3.20	7.90	4.80
1992	2.60	3.70	3.27
1993	3.90	15.40	7.73
1994	3.40	3.80	3.67
1995	3.50	4.70	3.97
1996	3.00	4.10	3.40
1997	3.30	4.80	3.83
1998	2.50	3.70	3.27
1999	2.30	4.20	3.25
2000	3.40	3.70	3.57

Table 6.

**LOON LAKE
PLYMOUTH**

**Specific conductance results from current and historic
sampling seasons. Results in uMhos/cm.**

Station	Year	Minimum	Maximum	Mean
EPILIMNION	1989	25.1	27.0	26.1
	1990	23.6	27.5	25.5
	1991	24.9	25.7	25.3
	1992	24.7	25.7	25.1
	1993	24.1	25.1	24.6
	1994	24.8	26.5	25.7
	1995	26.3	26.7	26.5
	1996	24.5	25.4	24.8
	1997	22.5	23.8	23.0
	1998	21.2	23.7	22.8
	1999	25.1	25.2	25.1
	2000	24.0	24.4	24.2
HYPOLIMNION	1989	26.3	28.3	27.5
	1990	26.6	27.0	26.7
	1991	25.3	29.3	27.2
	1992	26.0	30.0	27.7
	1993	24.1	27.0	25.2
	1994	25.6	32.4	28.5
	1995	26.0	27.1	26.5
	1996	26.1	30.8	27.9
	1997	22.0	26.0	23.6
	1998	25.5	28.7	27.1
	1999	24.3	26.8	25.5

Table 6.

**LOON LAKE
PLYMOUTH**

**Specific conductance results from current and historic
sampling seasons. Results in uMhos/cm.**

Station	Year	Minimum	Maximum	Mean
INLET #1	2000	24.8	25.0	24.9
	1989	32.5	43.2	38.8
	1990	34.3	50.8	41.8
	1991	36.5	50.2	45.5
	1992	37.5	42.7	40.7
	1993	47.3	56.5	52.3
	1994	43.4	51.9	47.4
	1995	45.7	56.4	52.1
	1996	26.6	48.9	37.8
	1997	35.7	47.0	42.3
	1998	32.6	47.5	40.8
INLET #2	1999	47.6	47.6	47.6
	2000	41.1	44.6	43.2
	1989	22.9	30.8	27.3
	1990	24.4	32.0	27.3
	1991	32.6	38.9	35.7
	1992	24.5	28.5	27.1
	1993	31.5	40.6	36.5
	1994	30.1	57.3	40.1
	1995	32.6	45.3	39.7
	1996	21.0	34.7	29.6
	1997	27.7	34.5	31.1
	1998	23.8	31.6	27.6
	1999	33.1	33.1	33.1

Table 6.

**LOON LAKE
PLYMOUTH**

**Specific conductance results from current and historic
sampling seasons. Results in uMhos/cm.**

Station	Year	Minimum	Maximum	Mean
METALIMNION	2000	29.6	33.0	31.4
	1989	24.5	26.4	25.6
	1990	22.8	27.3	24.7
	1991	25.4	26.8	25.9
	1992	24.4	26.0	25.2
	1993	23.6	26.2	24.7
	1994	24.4	26.7	25.2
	1995	25.4	27.1	26.3
	1996	24.6	25.7	25.0
	1997	21.9	23.4	22.5
	1998	22.3	23.9	23.0
	1999	24.2	24.3	24.2
	2000	23.6	25.8	24.6
OUTLET	1989	25.6	26.9	26.2
	1990	23.4	26.2	24.7
	1991	24.0	25.1	24.5
	1992	24.7	25.5	25.0
	1993	22.9	25.3	24.4
	1994	24.8	25.1	24.9
	1995	25.4	27.5	26.4
	1996	24.3	25.3	24.9
	1997	23.0	24.2	23.5
	1998	21.2	23.6	22.5

Table 6.

**LOON LAKE
PLYMOUTH**

**Specific conductance results from current and historic
sampling seasons. Results in uMhos/cm.**

Station	Year	Minimum	Maximum	Mean
	1999	23.8	23.8	23.8
	2000	23.7	24.1	23.9

Table 8.

**LOON LAKE
PLYMOUTH**

**Summary historical and current sampling season Total
Phosphorus data. Results in ug/L.**

Station	Year	Minimum	Maximum	Mean
EPILIMNION	1989	7	22	12
	1990	9	20	14
	1991	4	12	9
	1992	6	10	7
	1993	5	9	6
	1994	11	23	15
	1995	6	11	8
	1996	8	13	10
	1997	10	12	11
	1998	7	16	11
	1999	5	7	6
	2000	6	9	7
HYPOLIMNION	1989	10	33	18
	1990	13	18	15
	1991	5	16	11
	1992	16	31	25
	1993	18	21	19
	1994	19	41	27
	1995	12	22	16
	1996	9	20	14
	1997	13	23	18
	1998	10	18	14
	1999	8	19	13

Table 8.

**LOON LAKE
PLYMOUTH**

**Summary historical and current sampling season Total
Phosphorus data. Results in ug/L.**

Station	Year	Minimum	Maximum	Mean
INLET #1	2000	9	19	13
	1989	8	21	15
	1990	12	22	17
	1991	18	26	23
	1992	14	20	18
	1993	12	20	15
	1994	19	29	24
	1995	14	46	26
	1996	14	20	16
	1997	15	43	26
	1998	8	19	13
	1999	8	8	8
	2000	10	14	12
INLET #2	1989	11	22	16
	1990	15	29	20
	1991	15	20	17
	1992	14	532	187
	1993	13	35	22
	1994	11	37	26
	1995	13	45	28
	1996	13	23	19
	1997	18	22	19
	1998	8	20	13

Table 8.

**LOON LAKE
PLYMOUTH**

**Summary historical and current sampling season Total
Phosphorus data. Results in ug/L.**

Station	Year	Minimum	Maximum	Mean
	1999	9	9	9
	2000	16	21	18
METALIMNION	1989	10	22	15
	1990	11	106	47
	1991	3	15	10
	1992	8	11	9
	1993	6	16	10
	1994	9	22	14
	1995	9	12	10
	1996	7	13	10
	1997	11	13	12
	1998	6	14	9
	1999	6	20	13
	2000	7	14	9
OUTLET	1989	6	13	8
	1990	7	15	11
	1991	7	9	8
	1992	6	10	8
	1993	6	11	7
	1994	8	31	15
	1995	8	11	8
	1996	6	10	8
	1997	10	14	11

Table 8.

**LOON LAKE
PLYMOUTH**

**Summary historical and current sampling season Total
Phosphorus data. Results in ug/L.**

Station	Year	Minimum	Maximum	Mean
	1998	7	10	8
	1999	7	7	7
	2000	5	8	6

Table 9.
LOON LAKE
PLYMOUTH

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 21, 2000			
0.1	21.6	8.0	91.2
1.0	21.4	8.0	90.1
2.0	21.2	7.8	87.3
3.0	20.8	7.6	84.8
4.0	18.2	5.4	57.1
5.0	13.5	3.9	37.5
6.0	10.5	3.0	26.7
7.0	8.7	0.4	3.2
7.5	8.5	0.5	4.1

Table 10.**LOON LAKE
PLYMOUTH****Historic Hypolimnetic dissolved oxygen and temperature data.**

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
June 11, 1989	9.0	7.0	2.3	19.0
July 15, 1990	7.0	7.2	3.5	28.9
June 9, 1991	8.5	8.5	1.6	13.6
June 14, 1992	8.5	6.0	2.3	18.4
August 7, 1993	9.0	7.5	0.1	1.0
July 17, 1994	8.0	9.5	0.5	4.0
June 25, 1995	8.0	9.0	1.2	10.0
July 14, 1996	8.5	7.3	0.4	3.0
July 8, 1999	8.0	9.0	0.5	4.0
July 21, 2000	7.5	8.5	0.5	4.1

Table 11.

**LOON LAKE
PLYMOUTH**

**Summary of current year and historic turbidity sampling.
Results in NTU's.**

Station	Year	Minimum	Maximum	Mean
EPILIMNION	1997	0.6	0.6	0.6
	1998	0.7	1.2	0.9
	1999	0.6	0.6	0.6
	2000	0.5	0.6	0.5
HYPOLIMNION	1997	0.7	7.2	3.1
	1998	2.6	9.1	5.3
	1999	0.9	0.9	0.9
	2000	1.3	1.5	1.4
INLET #1	1997	0.6	1.3	0.8
	1998	0.6	2.5	1.5
	1999	0.9	0.9	0.9
	2000	0.9	1.0	0.9
INLET #2	1997	1.1	2.1	1.5
	1998	0.8	2.9	1.9
	1999	1.2	1.2	1.2
	2000	1.8	1.8	1.8
METALIMNION	1997	0.5	0.9	0.8
	1998	0.9	1.5	1.2
	1999	0.8	0.8	0.8
	2000	0.8	1.5	1.1
OUTLET				

Table 11.

**LOON LAKE
PLYMOUTH**

**Summary of current year and historic turbidity sampling.
Results in NTU's.**

Station	Year	Minimum	Maximum	Mean
	1997	0.6	0.7	0.6
	1998	0.6	1.5	1.0
	1999	0.6	0.6	0.6
	2000	0.5	1.0	0.7